LLNL-PRES-470878

Lawrence Livermore National Laboratory

COG Accomplishments

Rich Buck, Dave Heinrichs, Chuck Lee and Ed Lent

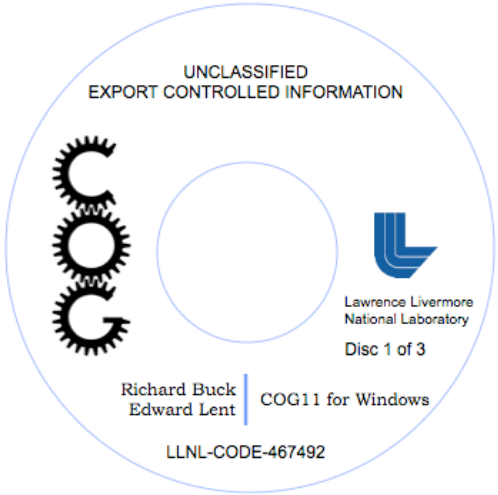
Presented at the Nuclear Criticality Safety Program Technical Conference
at Oak Ridge National Laboratory, March 1, 2011

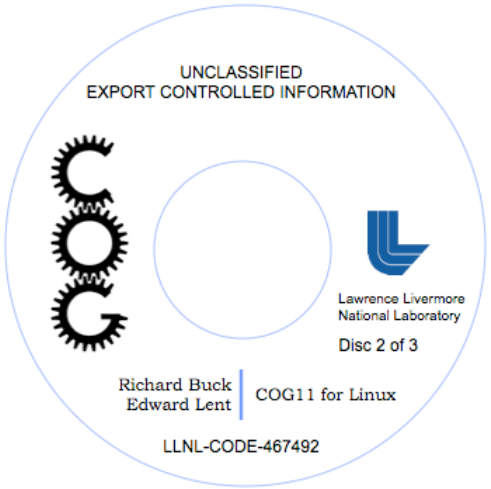
Lawrence Livermore National Laboratory, P.O. Box 808, L-198, Livermore, CA 94551-0808

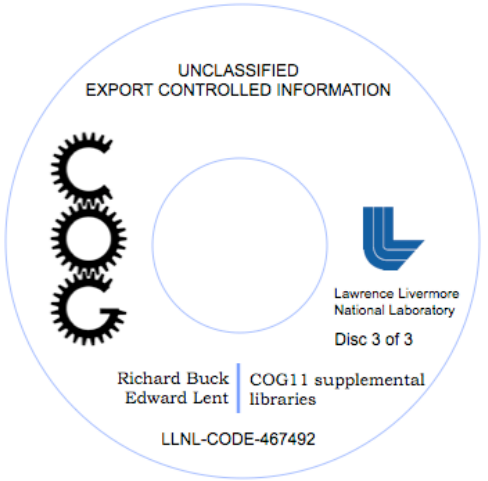
This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

Latest version accomplishments

- **COG11** = Modern, General Purpose, High-Fidelity, Multi-Particle, Monte Carlo transport code
  - LLNL approved **safety software** for criticality safety applications
  - LLNL approved limited distribution as **export controlled** software
  - Completed LLNL-SM-461824, “COG11 Manual Supplement”







Latest version status

- **COG11** = Modern, General Purpose, High-Fidelity, Multi-Particle, Monte Carlo transport code
  - **ICNC2011** paper submitted describing new features in COG11
  - **RSICC** testing in progress
  - Available soon!
  - http://cog.llnl.gov

What's new?

- **Geometry enhancements**

  – **LATTICE** geometry feature allows the user to easily specify a regular array of identical units of arbitrarily complex structure

  – **NOT** (exclusion) operator may be used to describe a sector as a volume that excludes other specified volumes and may be defined explicitly – in terms of its bounding surfaces – or implicitly – in terms of other previously-defined sectors

- **Enhanced visualization**

  – "COG11 **–xi** inputfile" enables interactive X-Window graphics

- **Enhanced parallel processing for Windows**

  – **MPICH2**

What's new?

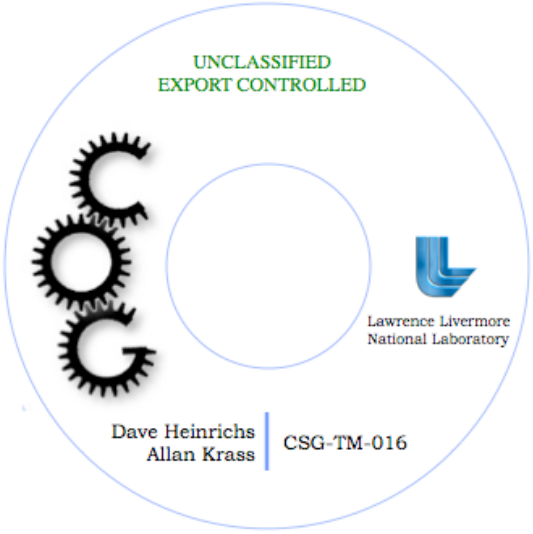
- **New continuous energy cross-section libraries**
  - ENDL99
  - ENDL2008
  - ENDFB6R8
  - ENDFB7R0
  - IAEAPNUC
  - JEFF2.2
  - JEFF3.1
  - JEFF3.1.1
  - JENDL3.3
  - MCNP.50c, MCNP.51c, MCNP.55c, MCNP.66c, MCNP.70c

What's new?

- New unresolved resonance region probability table libraries
  - PT.ENDFB7R0.BNL
  - PT.JEFF3.1
  - PT.JEFF3.1.1
  - PT.MCNP.66c, PT.MCNP.70c
- New thermal scattering – S(α,β) – libraries
  - T.ENDFB7R0, T.ENDFB7R0.BNL, T.ENDFB7R0.LANL
  - T.JEFF3.0, T.JEFF3.1, T.JEFF3.1.1

What's new?

- **New user training workbook**
  - **CSG-TM-016**



What's next?

- **More physics**
  - **JENDL4.0** (in progress)
  - **RadSrc** for α-decay to a user defined time to generate the gamma source (useful for shielding applications)
  - **COGDFG** library of delayed fission gammas (useful for criticality applications)
- **Enhanced visualization**
  - **WebGL** for 3-D visualization and manipulation

What's next?

- **Enhanced verification and validation**
  - ENDF/B-VII.1 testing
  - More benchmarking to ICSBEP handbook (HEU in progress)
  - V&V reports and input files available for downloading:
  - http://cog.llnl.gov/validation.html
- **Continued outreach**
  - CSG-TM-016 training for external users
  - Additional training modules (in progress)